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USSR Report

CONSTRUCTION AND EQUIPMENT

(FOUO 1/81)



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USSR REPORT
CONSTRUCTION AND EQUIPMENT
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CONSTRUCTION

PROBLEMS OF REGIONAL DEVELOPMENT OF MATERIAL BASES FOR CONSTRUCTION

Moscow MATERIAL'NAYA BAZA STROITEL'STVA: PROBLEMY REGIONAL'NOGO RAZVITIYA (The Material Base for Construction: Problems of Regional Development) in Russian 1979 signed to press 3 Aug 79 pp 3-5, 236-239

[Annotation, foreword and table of contents of book by Grigoriy Vasil'yevich Tersh, Izdatel'stvo Ekonomika, 5,000 copies 240 pp BBK 65.9(2)31 338:6C]

[Text] The book examines practical and theoretical questions of siting the material base of construction, develops a system and methods for study, and points out ways to improve regional planning and to raise effectiveness of regional development of production facilities for constructional structure and building materials. In so doing, great attention has been paid to regional problems of raising the technical level, of improving regional proportions and the structure of production, of forming regional industrial complexes, and of reducing rail haulage of constructional structure and building materials within economic regions. An important role is given also to questions of reducing the budget-estimated cost of construction in the country's eastern regions.

The book was designed for workers of planning organs and design and scientific-research institutes and for instructors, students and graduate students of engineering-economics and economics faculties of vuzes.

Foreword

The modern era of the country's economic development is marked by rapid rates of expanded reproduction of fixed capital, further rapid development of all branches of material production, and large-scale construction of housing and facilities for cultural and personal-services purposes.

More than 600 billion rubles' worth of capital investment is to be assimilated during the Tenth Five-Year Plan, and intensive development of production is to be provided through the expansion, reconstruction and technical reequipping of existing production facilities. The 25th CPSU Congress set exceptionally large tasks for further increase in the economic potential of the country's eastern regions, the execution of most huge integrated construction programs in Siberia and the Far East, and the assimilation of large amounts of capital investment in northern regions.

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Practical realization of this vast program for developing the national economy depends in the decisive stage upon the construction complex. Experience of past years indicates that inadequate development of construction's material base leads to the forming of large amounts of uncompleted construction, delayed introduction of enterprises into operation, and violation of regional proportions in the national economy.

Weak development of the construction complex and high budget-estimated cost of construction are also among the chief causes of inadequate development of the country's eastern regions. Meanwhile, in Siberia the prime cost of various types of rolled ferrous metals, electricity, fuel, forestry resources and some building materials is lower now than in many western regions of the country. This establishes a real basis for applying advanced production equipment and technology and constructional structure and building materials that are more effective and are produced by industrial methods to construction in regions of Siberia and the Far East. The task consists in an earnest study of regional problems of capital construction and its material base and discovery of ways to raise construction-work effectiveness and to reduce the budget-estimated cost of construction.

G. V. Teresh's book poses the greatest problems of regional development of construction's material base and notes ways for solving them through further improvement of regional proportions in the development of production, support for development of the material base for construction that anticipates increases in construction and installing work within economic regions, reduction in every possible way of rail haulage of freight-intensive constructional structure and building materials, and regularization of the regional management of branches of the industry.

Much attention is devoted to regional problems of technical progress as a basis for further growth and for a rise in the effectiveness of capital construction. Great reserves have been uncovered for improving the structure of material resources for construction in economic regions, for increasing concentration by branch of the economy and by region, for developing production comprehensively, and for forming large regional and interregional bases for producing various types of constructional structure and building articles and materials.

Among the major problems of regional development of the material base for construction, ways to reduce the budget-estimated cost of construction in Siberian and Far East regions also are examined. A detailed study of trends in regional differentiation of the prime cost of constructional structure and building materials has enabled the author to come to the important conclusion that the further formation in Siberia's southern regions of large bases for producing constructional structure and building materials will enable elimination of the higher costs that now exist in comparison with the country's central regions. In considering that expenditures for material resources will in the long term exceed 60 percent of the budget-estimated cost of construction and installing work, this will enable construction to be accomplished in Siberia's southern regions at no greater cost than in many western regions.

Another important task for reducing the budget-estimated cost of construction in Siberian and Far East regions is further regularization of wholesale and budget-estimated prices for material resources for construction work. An analysis by the author of the prevailing system for setting prices for construction and the

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constructional-structure and building-materials industries testifies to an artificial overstating of wholesale and budget-estimated prices for constructional structure and building materials in a large number of cases. The author's conclusions about the need for a reexamination and for the establishment of wholesale and budget-estimating prices for material resources that will encourage construction in regions of Siberia and the Far East are of great importance in solving major national-economic tasks for accelerating the development of industry and in bringing the rich mineral raw-material and natural resources of these regions into economic circulation.

G. V. Tersh's book is of scientific and practical interest. It is aimed at further improving the system for studying the regional development of the material base for construction, for improving regional planning, and for raising the effectiveness of producing constructional structure and building materials.--Academician N. N. Nekrasov.

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CONSTRUCTION

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WORKING CAPITAL FOR CONSTRUCTION ORGANIZATIONS

Moscow OBOROTNYYE SREDSTVA STROITEL'NYKH ORGANIZATSIY: PRAKTICHESKOYE POSOBIYE
(The Working Capital of Construction Organizations: A Practical Guide) in Russian
1979 signed to press 12 Apr 79 pp 2-4, 175

[Annotation, introduction and table of contents of book by A. S. Anatoliy Stepanovich Vykhodtsev and Viktor Petrovich Shchur, Stroyizdat, 10,000 copies, 175 pages]

[Text] Light is thrown on the problems of the planning and use of working capital of construction organizations. The composition, structure and peculiarities of circulation, sources for forming working capital for construction, and questions of effective planning based upon the methods of mathematical economics and with the application of computer equipment are examined. Ways for making better use of working capital at the various levels of economic management are indicated.

The book is intended for engineers and technicians of construction organizations and financing and planning organs.

Introduction

Progress in construction and a rise in the economic effectiveness of construction operations are impossible without improvement of the use of all resources, a most important component of which is working capital.

On 1 January 1977 the working capital of contracting construction and installing organizations was about 58 billion rubles. This is an enormous amount, and the task is to improve considerably the use of these funds. Attributing exceptionally important national-economic significance to the correct and economical use of fixed capital, the 25th CPSU Congress pointed out the need to accelerate its turnover.

CPSU Central Committee General Secretary and Chairman of the USSR Supreme Soviet Presidium L. I. Brezhnev stated in his speech to the 18th Komsomol Congress: "We will make economic managers strictly answerable for sluggishness, for lack of skill in the correct concentration of forces and resources, and for freezing the people's capital at uncompleted construction projects."*

Much work has been devoted to questions of working-capital theory and the organization and use of working capital that reflects deeply many aspects of these complicated and multifaceted topics.

*KOMMUNIST, No 7, 1978, page 12.

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Direct research on the working capital of contracting construction and installing organizations also has been covered in many works.

Such a large number of works does not obviate the necessity for further study of a number of theoretical propositions and procedural questions and for generalization and analysis of the practical experience gained by construction organizations in the area of forming and using working capital.

Economics is a complicated and dynamic organism whose development in and of itself engenders new problems. The solution of problems that arise during implementation of the economic reform in the area of organizing the working capital of contracting construction organizations is of great practical importance.

The experience of construction-organization operation under the new terms for planning and for economic incentives indicates that failure to resolve certain questions connected with forming working capital prevents full use of all the advantages of new management methods, which are aimed at raising the economic effectiveness of construction work.

The Introduction and chapters I, III and IV were written by Candidate of Economic Sciences V. P. Shchur, Chapter II by Candidate of Engineering Sciences A. S. Vykhotsev. Engineer O. I. Pogrebnyak helped to write item 2 of Chapter II.

The authors express deep gratitude to Candidate of Economic Sciences Ye. P. Pankratov for useful advice and remarks that were expressed to them while the book was being prepared for publication.

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FUNDAMENTALS OF DESIGN OF NONINDUSTRIAL, INDUSTRIAL BUILDINGS

Moscow OSNOVY PROYEKTIROVANIYE GRAZHDANSKIKH I PROMYSHLENNYKH ZDANIY (Fundamentals of Design of Nonindustrial and Industrial Buildings) in Russian 1980 signed to press 26 Dec 79 pp 2, 3, 239, 240

[Annotation, foreword and table of contents of book by B. Ya. Orlovskiy and A. A. Magay, Stroyizdat, 80,000 copies, 240 pages]

[Text] The basic rules for the standard design of industrial and nonindustrial buildings, as well as standard-practice instructions on designs for such buildings that are prepared in conjunction with academic or graduation work, are set forth. Light is thrown briefly on questions of the module system and the establishment of standard models and the unification of the buildings being studied. The classification of industrial and nonindustrial buildings and their three-dimensional layout structure, constructional schemes and systems, and economic and technical indicators are examined. The general principles for laying out microrayons and for designing master plans for industrial enterprises are given.

The book is intended for students of secondary educational institutions for the specialty, "Industrial and Nonindustrial Construction."

Foreword

The constant perfecting of constructional processes and of construction equipment requires that the training of skilled cadres of workers and specialists be improved, as was indicated at the 25th CPSU Congress. Realization of the tasks posed by the party and the government in the construction field depend greatly upon the vocational training and knowledge of these individuals.

During the learning process, the future construction technicians should master not only a knowledge of construction that corresponds to the level achieved but also, to a certain extent, a knowledge that meets the requirements for the long-range development of construction.

The purpose of this publication is to acquaint students of construction tekhnikums with the fundamentals of the design and construction of housing, social and industrial buildings and structures. However, it cannot pretend to be an exhaustive exposition of all the information of the approved existing program. Therefore, in making up the draft, the authors proceeded from the principle of further developing the theoretical scientific bases of the course, "The Architecture of Nonindustrial

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and Industrial Buildings," as applicable to the design of such buildings. It was adopted as an underlying principle that, in an era of scientific and technical progress, future construction technicians should be able to find independently the correct solutions for modern architectural and construction tasks.

The book gives the theoretical fundamentals for standard design that our country has adopted as the basic direction in developing designs for nonindustrial and industrial buildings, examines questions of module coordination and unification, and gives brief information about master plans.

Great attention has been paid to study of the establishment of types of industrial and nonindustrial buildings and of their architectural and layout solutions and to questions of the functional and technological interrelationships of the various zones and premises.

One of the important steps in reinforcing theoretical knowledge is the execution of academic and graduation designs. While working on such designs, difficulties arise for the students in positioning the drawings on the sheets and in configuring them, in the sequence of drawing and layer tinting, and in setting forth information in the explanatory notes and in making out the heat-engineering schedule. The book cites in the required volume the standard practices for developing designs, and examples of heat-engineering schedules for walls and roofs are given. The modern progressive architectural, layout and design solutions for buildings presented in the training aid can be examples for further, more concrete development of various types of buildings.

Much importance is now attributed to questions of economies in construction, so the book cites the main technical and economic indicators for various designs for the solutions of buildings for master plans for housing buildups and for industrial enterprise zones.

The indicated consolidated numerical technical and economic indicators should not be viewed during an academic or graduation design as fixed, since these indicators are changed rapidly. However, they illustrate well the methodology of technical and economic analyses that are made during the design of various facilities and enable judgments to be made about the comparative relationships of these indicators.

It should be noted, in conclusion, that a study of the course, "Fundamentals of the Design of Nonindustrial and Industrial Buildings," is based upon knowledge that has been obtained about drafting, drawing, constructional structure and other general-theoretical and special disciplines.

The authors are deeply grateful for the reviews made by Candidate of Architecture G. Yu. Orlov and to instructor of the Donetsk Construction Tekhnikum Ye. N. Ratnikova for valuable comments and recommendations about improving the content of this publication.

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LAYOUT, DEVELOPMENT OF RURAL COMMUNITIES

Moscow PLANIROVKA I ZASTROYKA SEL'SKIKH NASELENNYKH MEST V SSSR (The Layout and Development of Rural Communities in the USSR) in Russian 1980 signed to press 29 Dec 79 pp 2, 3, 296

[Annotation, foreword and table of contents from book by R. D. Bagirov, V. R. Belen'kiy, V. M. Belyayev et al, edited by B. A. Makhan'ko et al, Stroyizdat, 1980, 13,000 copies, 296 pages]

[Text] The socio-economic and urban-development bases for transforming rural settlements in the USSR are laid down; and the principles for shaping their layout structure and architectural and spatial organization and for improving types of housing and buildings for cultural and personal-services purposes are examined, as are questions of utilities and services equipment, civic improvements, and the industrialization of rural construction. Light is thrown on achievements in the design and construction both of rebuilt and of new rural settlements with a high level of civic improvements.

The book is intended for architects and urban developers. It contains 4 tables, 184 illustrations and a bibliography with 95 entries.

Foreword

Elimination of the socio-economic, cultural and domestic differences between the city and the village is one of the main social tasks of building communism. The Communist Party and the Soviet Government are steadily and gradually solving this task, primarily by a mighty upsurge of agriculture's productive forces and its new production equipment. Important advances have occurred in this area since the March 1965 Plenum of the CPSU Central Committee.

An integrated scientific approach to solving organizational and economic questions and all-around consideration of new tasks and the growing practical potential for realizing them mark the party's current policy for the countryside. The scale of the program of economic and social progress in agriculture that is being implemented is graphically evident in the example of the reconstruction of rural communities.

Construction in the countryside has followed a lengthy and complicated path: the first settlements of collective farms and specialized grain sovkhozes, the standard designs of the 1920's to 1930's, the large-scale construction of new communities in

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Kazakhstan, Altayskiy and Krasnoyarskiy krays and Novosibirskaya, Omskaya and some other oblasts during assimilation of the virgin and fallow lands of the 1950's and, finally, the integrated program for transforming the Nonchernozem Zone, which includes, along with development of an agricultural-industry complex, improvement of the structure of settlements, are some of the stages of this path.

In speaking at the July 1978 Plenum of the CPSU Central Committee, Comrade L. I. Brezhnev said, "Rural construction is today a very important element in solving social problems. The party is firmly following the policy of radically improving housing, cultural and living conditions in the countryside."* "All these achievements demonstrate convincingly the advantages of the socialist planned system for the economy and the creative and constructive forces of Soviet society," stated the CPSU Central Committee decree of 12 July 1979, "On Further Improving the Economic Mechanism and the Tasks of Party and State Organs."#

This monograph attempts for the first time to generalize the great experience gained in rebuilding the village, primarily in the area of nonindustrial construction, including improvement in the settling of people in rural areas and the design and construction of rural housing and social buildings.

This work uses scientific-research data of the central and zonal institutes of Gosgrazhdanstroy [State Committee for Nonindustrial Construction and Architecture under USSR Gosstroy]: the TsNIIIEP's [central scientific-research and design institutes for standard and experimental design] of housing, educational institutions, trade and personal-amenity buildings and tourist complexes, spectator buildings and sports structures, and utilities and services equipment, Giproniizdrav [State Design and Scientific-Research Institute for the Design of Public-Health Buildings], LenZNIIEP [Leningrad Zonal Scientific-Research and Design Institute for Standard and Experimental Design of Housing and Social Buildings], KievNIITI [Kiev Branch of the Scientific-Research Institute for the Theory, History and Long-Range Problems of Soviet Architecture], SibZNIIEP [Siberian Zonal Scientific-Research and Design Institute for Standard and Experimental Design of Housing and Social Buildings] and TashZNIIEP [Tashkent Zonal Scientific-Research and Design Institute for Standard and Experimental Design of Housing and Social Buildings], as well as the republic scientific-research institutes of Belniigiprosel'stroy [Belorussian State Scientific-Research and Design Institute for Rural Construction] and Ukrniigrazhdansel'stroy [Ukrainian Scientific-Research Institute for Nonindustrial Rural Construction].

The monograph was prepared by a collective of scientific workers of TsNIIIEPgrazhdansel'stroy [Central Scientific-Research and Design Institute for the Layout and Development of Rural Communities and the Construction of Housing and Nonindustrial Buildings in the Countryside], with the participation of specialists of the Moscow

*"On Further Development of USSR Agriculture. Report of CPSU Central Committee General Secretary L. I. Brezhnev at the 3 July 1978 CPSU Central Committee Plenum." PRAVDA, 4 July 1978.

#"KPSS. TSK. O dal'neyshem sovershenstvovanii khozyaystvennogo mekhanizma i zadachakh partinykh i gosudarstvennykh organov: Postanovleniye TsK KPSS ot 12 iyulya 1979" [The CPSU. The Central Committee. On Further Improvement of the Economic Mechanism and the Tasks of Party and State Organs: Decree of the CPSU Central Committee of 12 July 1979.] Moscow, Politizdat, 1979.

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Architectural Institute, TsNIIEP for Utilities and Services Equipment, and TsNIIP gradostroitel'stva [Central Scientific-Research and Design Institute for Urban Development].

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ORGANIZING TECHNICAL SERVICING, REPAIR OF CONSTRUCTION MACHINERY

Moscow REKOMENDATSII PO ORGANIZATSII TEKHNIЧЕСКОГО OBSLUZHIVANIYA I REMONTA STROITEL'NYKH MASHIN (Recommendations for Organizing the Technical Servicing and Repair of Construction Machinery) in Russian 1978 signed to press 8 Feb 78 pp 2, 91, 92

[Annotation and table of contents from book by Central Scientific-Research and Experimental-Design Institute for the Organization and Mechanization of and Technical Assistance to Construction of USSR Gosstroy and the All-Union Scientific-Research Institute of Construction and Road Machine Building, Stroyizdat, 140,000 copies, 92 pages]

[Text] The Recommendations contain rules about the procedure for executing a set of basic measures for the system of planned preventive technical servicing and repair of construction machinery, instructions on planning of, accounting for, and organizing the conduct of these operations, as well as indicators for the periodicity, labor intensiveness and duration of technical servicing and repair.

The Recommendations were developed by TsNIIOMTP [Central Scientific-Research and Experimental-Design Institute for the Organization and Mechanization of and Technical Assistance to Construction] of USSR Gosstroy and VNI Istroydormash [All-Union Scientific-Research Institute for Construction and Road Machine Building] of the Ministry of Construction, Road and Municipal Machine Building.

The Recommendations are intended for engineers and technicians of construction and design organizations who are concerned with questions of planning and organizing the technical servicing and repair of construction machinery.

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METALWORKING EQUIPMENT

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SPECIALIZED NUMERICALLY CONTROLLED MACHINE TOOLS

Moscow STANKI S CHISLOVYM PROGRAMMNYM UPRAVLENIYEM (SPETSIALIZIROVANNYYE) (Machine Tools with Numerical Program Control (Specialized)) in Russian 1979 signed to press 30 Mar 79 pp 2-6, 590-592

[Annotation, foreword and table of contents of book edited by USSR State Prize Winner Doctor of Engineering Sciences Professor Viktor Andreyevich Leshchenko, Mashinostroyeniye, 11,000 copies, 592 pages]

[Text] The book sheds light on the bases for constructing functional schemes and configurations for metal-cutting machines with numerical program control (ChPU) and on methods for calculating the pliancy and longevity of numerically controlled [NC] machine-tool components and for preparing control programs. The schemes and designs of many specialized machine tools are shown and analyzed. Questions of increasing the operating effectiveness of NC machine tools and of creating automatic production systems are examined.

The book is intended for engineers and technicians associated with the design and operation of NC machine tools.

Foreword

The start of the industrial application of NC machine tools dates from the 1957-1960 period. Initially, NC machine tools replaced copy milling machines for machining irregularly shaped surfaces: the magnetic or perforated tape, which enabled the numerical (digital) method of assigning the program (or information) to be introduced, replaced the template. As NC systems were improved, other groups of machine tools--lathes, drills, boring machines and grinders began to be used.

The use of NC machine tools enabled great economic benefit to be obtained and a large amount of general-purpose equipment to be released. The effectiveness of such machine tools, according to domestic and foreign data, is marked by growth in productivity; the replacement of numbers of general-purpose machine tools; a reduction in the time required for preparing for production and tooling; a reduction of scrap; an interchangeability of parts; a reduction or complete elimination of marking work and adjustment and fitting operations; and the introduction of calculated engineering norms, beginning with the launching of a new item, providing thereby for a considerable reduction in labor intensiveness and a rise in labor productivity.

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Experience in the use of NC machine tools has indicated that the effectiveness of their use increases with rise in precision and complexity of machining conditions, with the necessity for mutual shifting of parts and tools in 5-6 coordinates during machining with multitool, multiple-operation machining of parts on one installation, and so on.

An important aspect of utilization effectiveness of NC machine tools was the substantial reduction in the proportion of heavy manual labor of workers, reduction in the requirement for skilled general-purpose lathe operators, and change in the composition of workers of metal-machining departments. It is possible, because of this, to single out the following basic trends in the scientific organization of labor when introducing machine tools and other NC equipment: the involvement of engineers in the direct process of manufacturing parts; the organization of multiple machine-tool servicing; and integrated automation of parts manufacture during small- and medium-size series production, with the work controlled in the department from a computer.

The problem of providing for round-the-clock use of equipment is being resolved on the basis of creating automated production systems, controlled from a computer and made up of NC machine tools and transport. In so doing, the way is being paved to support the work of production personnel who prepare the work for the production system, mainly during the first--and most productive--shift, while a small staff of attendants works during the second and third shifts.

The use of NC machine tools in practically all branches of machinebuilding has become in recent years one of the main trends in the area of automating metal-cutting machining.

Operators and setup personnel, foremen, design engineers (mechanical, electrical, electronic, hydraulic and computer) and manufacturing engineers, and programmers and economists, as well as supervisory workers (department heads, chief engineers and plant and design-bureau directors) take part in the development, manufacture and operation of NC equipment. The effectiveness of these specialists' work and the correctness of the solutions they apply depend greatly upon their knowledge of questions associated with the creation and operation of NC equipment. This book was designed to extend assistance in this area. In so doing, it was borne in mind that deeper study of questions in an area of narrow specialization should be performed with the use of supplemental technical literature.

The area of use of numerical control is being expanded simultaneously with the development and improvement of NC installations and of the machine tools themselves. Thus, NC systems with program carrier in the form of magnetic tape are giving way to punched-tape systems, and they, in turn, to systems with built-in memory based upon magnetic elements. The structure of NC systems is being changed: to the replacement of a rigid block structure by a pliant, easily reprogrammed structure, one which is based upon mini- or microcomputers that are constructed on the basis of elements with a great degree of integration. New, more rational and effective engineering solutions for all NC machine-tool elements are being demonstrated at international machine-tool exhibitions. At the same time, all NC machine tools combine the general principles of NC operation. So it is desirable to examine in historical sequence the principle of operation of NC machine tools, the basic concepts that relate to their operation, and questions of the precision of reproduction of the numerical program, for example, of milling machines:

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from supplying them with the simplest pulse-signal and phase systems for NC, where the program carrier is a magnetic tape, to an NC system with a ramified structure where the program carrier is a punched tape (chapter 1).

Conversion to the use of NC not only has changed the nature of production organization in metal-machining departments but has radically influenced design of the machine tools themselves. The principle of construction of functional schemes and configurations for NC machine tools has been changed. Long bifurcated schemes have given way to fundamentally simple schemes with autonomous drives for each of the coordinates of travel. Ganging and unification have begun to be used more completely and effectively, and the prerequisites have been established for creating multiple-operation machine tools for integrated machining and of integrated systems for comprehensive automation based upon NC machine tools and centralized control from a computer (chapter 2).

The direct dependence of the quality of parts machined on NC machine tools upon the precision of travel of the working members in strict accordance with the program and upon the stability of this precision during the entire period of operation of the machine tool has required the creation of new designs for basic elements--carriages, tables, transmissions and spindle components of NC machine tools. Design features of these traditional machine-tool components, and also of specialized NC machine-tool arrangements for automatic shifting of the tool and for other purposes, are examined in chapter 3.

In addition to the methods for rating metal-cutting machine tools [17, 38 and 45] that are described broadly in the technical literature, the book devotes attention to the characteristics of rating based upon the rigidity, strength and durability of the machine-tool elements (chapter 4).

A number of monographs on NC systems and electric and hydraulic drives for NC machine tools [27 and 34] have been published in our country in recent years, so this book is restricted to an exposition of questions of the construction, technical data and methods for rating the basic types of systems, drives and means for automation that are used in domestic NC machine tools (chapters 5-7) and their industrial potential, and to an examination of the peculiarities of manufacture and operation of the main types of specialized milling machines (chapter 8), specialized drilling-and-boring, multiple-operation machines (chapter 9), and specialized turning (chapter 10) metal-cutting machines with NC. In so doing, the commonality of the principles of construction and of the basic engineering solutions of structure for general-purpose and specialized NC machine tools was kept in mind. However, specialized equipment is distinguished by great diversity and complexity of design: the magnitudes of travel--from 10's of millimeters to 20-30 meters or more; the number of coordinates controlled--to 5-6 or more; the presence of several spindles; the range of transmissions and speeds which satisfy rational machining regimes for lightweight alloys, steel, titanium, heat-resistant materials, and so on.

High effectiveness in the use of NC equipment is achieved solely on the basis of solving the entire set of questions associated with the industrial operation thereof. These include primarily questions of automatic calculation and writing of control programs (chapter 11), of the technological preparation of the cutting, measuring and attaching tools, and of optimal organization of the operation and repair of NC machine tools (chapter 13). The characteristics of specialized

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machine tools have brought about the necessity to pay special attention, back at the stage of development of the working drawing, to questions of the automated preparation of programs for multicoordinate contour machining and of providing optimal effectiveness in the use of specialized machine tools.

The book also briefly describes problems associated with creating automated production systems--automatic lines made up of NC machine tools controlled by a computer, taking into account the experience gained in this area by innovators (chapter 12).

The authors distributed among themselves the work of writing this book as follows: the Introduction and chapters 2 and 7 were written by V. A. Leshchenko; chapter 1 by V. M. Kiselev and V. A. Leshchenko; chapters 3 (3.1-3.4 and 3.6) and 10 by M. I. Dobromyslin; chapters 3 (3.5 and 3.7) and 9 by D. A. Kupriyanov; chapter 4 by U. G. Govberg; chapters 5 and 6 by V. M. Kiselev; chapter 8 by A. M. Leonov; chapter 11 by N. A. Bogdanov; chapter 12 by V. V. Pashkov; and chapter 13 by V. A. Leshchenko and G. M. Koshelev.

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